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Drones in the Hive

To correlate the debate in the House on Order No. 240G—Registration for Employment—with its actual terms would give the impression of complete irrelevancy, for the Order merely enacts that after December 8 the Minister of Labour and National Service has the power to call upon—with stated exceptions—groups of people to register with the Labour Exchanges, and that is all. No penalties for non-compliance are detailed. The Order which matters is the Control of Engagement Order; this, as we pointed out in our issue of October 9, was useless on its own as a means of conscripting "spivs and drones" for industry, for "so long as a person avoids the Labour Exchange, he is free to pursue his chosen activities, or indeed set himself up as a one-man business." Suspecting that the Government would realise this weakness, we also wrote: "To realise the full effect of this Control of Engagement Order, one must await other Government actions." This, then, explains the trend of the recent debate in the House. In our opinion, the publication of the two Orders should have been reversed, for the registration would have provided data upon which the Control of Engagement could have been enacted with a surer knowledge of the size of the problem. At the moment the Minister talks of 500,000 people as being the potential reservoir of labour uneconomically employed. We refuse to believe that the majority of these are either "spivs" or "drones," as one would gather from the debate.

We can assure His Majesty's Government that, so far as the "dyed in the wool" spiv is concerned, there is no place for him in the foundry industry, as young men well versed in the arts of dodging the police would find the average foreman easy meat. This type, so used to getting quick money, would find a ready-made market amongst his work-mates, rapidly deteriorating the weaker characters amongst them into playmates. Industry is operated through a loose aggregation of teams, and the building-up of these is just as complicated as the formation of a combination guaranteed to give a good show in the first division of the Football League. Good sides can be spoilt by the introduction of a selfish player or the creeping-in of indiscipline. So, too, can the effectiveness of an industrial team be sabotaged.

Well knowing this, we doubt the wisdom of directing men into foundries, especially where they carry with them—probably quite wrongly—the slur of being "spivs and drones." In the 1914 war, the counterpart of these people decided that making munitions was a better proposition than "footslogging." The arrival of one of this fraternity—a cardsharper by trade—into a North-East Coast steelworks quickly created chaos. The mess-room—the term then used for the canteen—became a gambling den to the impoverishment of the staff. He established himself as the local bookmaker's agent. He organised the private segregation of tramp bronze and brass and its subsequent illicit disposal. His craftiness prevented the discovering of his actions for some weeks, and he was plausibly indignant on being "given his cards." A well-known middle-weight boxer turned out to be quite a good labourer, except that he not only got drunk himself, but also got his mates into the same condition, with much lost time and inefficient work as a consequence. If these be typical of the men who are to be directed into industry, then production will decrease, and not increase as the statisticians would have us to believe.

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The Iron and Steel Institute

The Iron and Steel Engineers' Group

The Fifth Meeting of the Iron and Steel Engineers' Group will be held at the offices of the Institute, 4, Grosvenor Gardens, London, S.W.1, in the morning and afternoon of Wednesday, November 26, 1947 (chairman, Mr. W. F. Cartwright). A buffet luncheon will be held in the Library in connection with the meeting. The following is the detailed programme:—

10.30 a.m. to 12.45 p.m.—Presentation and discussion of two Papers on "The Mechanical and Electrical Features of Primary Hot-rolling-mill Auxiliaries," by W. W. Franklin (Davy & United Engineering Company, Limited) and P. F. Grove (John Miles & Partners (London), Limited).

12.45 p.m. to 2 p.m.—Buffet luncheon (tickets 6s. each).

2 p.m. to 4.30 p.m.—Presentation and discussion of a Paper on "Modern Small Rolling Mills," by G. A. Phipps (Guest Keen & Nettlefolds, Limited).

New British Chemical Standards

The Bureau of Analysed Samples, Limited, Middlesbrough, announce two new analytically standardised samples, *viz.*, No. 233 Permanent Magnet Alloy and No. 230 Cast Steel. The percentage composition of these standards is as follows:—

No. 233 Permanent Magnet Alloy	
Nickel	11.22
Aluminium	6.98
Copper	5.09
Provisional Figures	
Cobalt	23.7
Titanium	0.78
Manganese	0.23
Alumina	0.025
No. 230 Cast Steel	
Nitrogen	0.007
Nickel	0.143
Chromium	0.464
Molybdenum	0.173
Copper	0.085
Approximate Figures	
Carbon	0.17
Silicon	0.2
Phosphorus	0.04
Manganese	0.5

The permanent magnet alloy will be useful to chemists for checking accurate determinations for Ni, Al, Cu, etc., in alloys of this type. No. 230 Cast Steel has been prepared specially for nitrogen content and residual metals.

Both standard samples are supplied as usual in bottles of 25, 50, 100 and 500 grms., and each bottle is accompanied by a Certificate of Analysis showing all the co-operating chemists' figures and the average of all. The certificate also gives an outline of the methods employed by each chemist in the analytical standardisation. Supplies may be obtained direct from the Bureau or from the usual laboratory furnishers.

Forthcoming Events

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

NOVEMBER 22.

Institute of British Foundrymen.

West Riding of Yorkshire Branch:—"Improved Cupola Design from Practical Experience," by J. Timbrell, Sn., at the Technical College, Bradford, at 6.30 p.m. (This meeting was originally arranged for November 18.)

NOVEMBER 24.

Sheffield Society of Engineers and Metallurgists

"The Rocket as a Weapon of War," by Sir Alwyn Crow, C.B.E., in the Royal Victoria Station Hotel, Sheffield, at 6.15 p.m.

Royal Statistical Society

Sheffield Group:—"Examinations Examined," principal speaker F. C. Turner, at the University, St. George's Square, Sheffield, 1, at 6.30 p.m.

NOVEMBER 26.

Institute of British Foundrymen.

London Branch:—"Foundry Conditions, Personnel, and Production," by R. Coates (President, East Anglian Section), at the Waldorf Hotel, Aldwych, London, W.C.2, at 7.30 p.m.

Birmingham, Coventry, and West Midlands Branch:—"Graphite Formation in Cast Iron," by H. Morrogh, in the James Watt Memorial Institute, Great Charles Street, Birmingham, at 7.15 p.m.

The Iron and Steel Institute.

Iron and Steel Engineers' Group:—Fifth meeting, to be held at 4, Grosvenor Gardens, London, S.W.1, commencing at 10.30 a.m. See details on this page.

NOVEMBER 27.

The Institute of Metals.

Birmingham Section:—"Metal Spraying," film and talk on "Protective Coatings," by W. E. Ballard, at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 6.30 p.m

London Section:—Special Meeting—"Malleable Titanium and Zirconium," by Dr. W. J. Kroll, at 4, Grosvenor Gardens, London, S.W.1, at 7 p.m.

Conference Papers Sought

The next Annual Conference of the Institute of British Foundrymen will be held in London from June 8/11th, 1948. Members of the Institute and non-members are invited to offer papers for presentation to the Conference, and those who intend to accept this invitation are requested to communicate with the Secretary immediately. The Secretary will also supply to prospective authors a copy of the Institute's publication "Notes for the Guidance of Authors of Papers." Letters are to be sent to the Office of the Institute at St. John Street Chambers, Deansgate, Manchester, 3.

Vitreous Enamelled Aluminium

The Light Metals Founders' Association in their Bulletin for November announce the forthcoming availability of a second set of analytical standards. Reference is again made to the application of vitreous enamel to aluminium alloys. It appears that at the moment only a lead silicate glaze is available which fixes at a temperature of about 500 deg. C. The only colours now being made are black, green, brown and blue. Carried out as lead-bearing enamelling, the process is subject to Order No. 1258 of the Factory and Workshops Act.

THE BUILDING EXHIBITION opened yesterday at Olympia; it remains open until December 4.

Ferrous Die Castings*

The Continuous Production Process

By C. D. Pollard, H. A. Redshaw, and C. A. Payne

Research and development in the foundry industry during the lifetime of the Institute of British Foundrymen have resulted in tremendous strides being made, not only in materials, but in plant and processes as well. Apart from new developments and discoveries in each sphere, these advances have been in the direction of the control and limitation of variables, the more effective production of both quality and quantity and the replacement of manual by mechanical effort.

The unique engineering properties and ubiquitous applications of that vast range of alloys, the cast irons, have been established as the result of work in research laboratories, development plants, foundries and users' factories, and justified in the final test—service. The practical foundryman's problem is the making of sound, dimensionally acceptable castings to exacting specifications, on an economic basis. To this end, he can call on the services of an ever-improving team of specialists in the drawing office, the planning and estimating office, the cost office and the laboratory. With all these tools at hand, he cannot produce the castings or "deliver the goods" without the manpower to do the job.

This problem of manpower is being tackled generally on a three-fold basis throughout the industry, by improvement in surroundings and conditions, by reducing manual drudgery, and by mechanical devices to increase productive efficiency and hence the workers' rewards. Much of this amelioration centres around schemes of complete or partial mechanisation, topics by no means new to papers and discussions. The keynote of any such system should be flexibility, of both product and output. Many highly organised schemes have failed in their full justification because of the limited range of the types of castings and the rates at which they can be produced. The long-term full effectiveness of a mechanised plant is the only economic justification of the initial high capital outlay.

Numerous plans and ideas, considered at the works with which the Authors are associated, have not come unscathed through examination on such a basis. The mere provision of mechanical aid to handling was not considered, in itself, an adequate answer to the pressing problems of continuous quantity production of quality castings. The opportunity to investigate the Eaton-Erb Process, during the early period of the recent war, offered a potential solution of many of these problems. Its introduction into this country, its development and ultimate establishment as a commercially successful competitive process, have, in this case, fully justified not only the high initial cost but the arduous and exacting "spade work" involved.

Description of Machine

The Eaton Erb Machine (Fig. 1) is essentially a large, horizontal wheel, the spokes of which are twelve hollow, rectangular section arms. At the periphery of the wheel are mounted the fixed outer halves of the cast-iron dies. Between these spokes, the inner, movable half of the mould is mounted on a frame fixed to the end of a piston operated by compressed air. Rollers and slides take the weight of the inner heads, and the opening and closing of the two halves (by movement inwards or outwards of the movable half), is controlled by three-way valves on the air cylinders. The valves are automatically operated by means of cams situated round the hub of the wheel, the position of the cams being adjustable, to enable the opening and closing of the dies to be arranged at any predetermined point (Fig. 2).

The machine is driven through a reduction gearbox by a 1-h.p. motor. The speed of rotation can be varied from 2 minutes up to 8 or 9 minutes per revolution, variations in cycle being to accommodate the solidification times of varying casting sections and

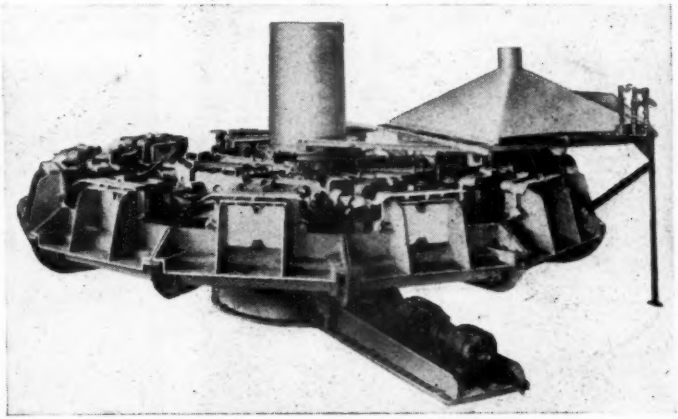

FIG. 1.—GENERAL VIEW OF EATON-ERB MACHINE.

* Paper presented at the Annual Conference of the Institute of British Foundrymen held in Nottingham in June, 1947.

Ferrous Die Castings

FIG. 2.—COMPRESSED AIR MECHANISM.

to control die temperatures. As will be seen later, this process is not merely of mechanical significance, it has also a profound metallurgical influence.

For further assistance in controlling die temperatures, provision is made for air cooling of both halves. Fig. 3 shows the back of the outer head with a die in position. The die is of open box section (*i.e.*, the bottom of the box is the die-proper and the sides of the box are ¼-in. walls), with cooling pins of approximately ½ in. dia. cast integrally with the die. A baffle plate is fitted so that the cooling air, drawn through by a powerful fan, situated at the top of the duct forming the hub, must pass over these pins. The flow of air is then through the hollow frame and arms into the centre duct. The movable half is cooled in a similar fashion, air connections being made by means of slots in the bottom of the inner head, and a telescopic pipe (Fig. 4).

Between the opening and closing points are situated the compressed air cleaner and the sooter. Both consist essentially of long closed-end pipes midway between the opened dies, and provided with a number of fine jets in two rows, one row facing each half die. Operation of these is automatic, being regulated by cams mounted on the outer head (as shown in Fig. 3) and rollers opening and closing the valves. In the next illustration (Fig. 5) the cam, roller and sooter can be seen in operation. The soot is generated by the combustion of acetylene gas without prior admixture with

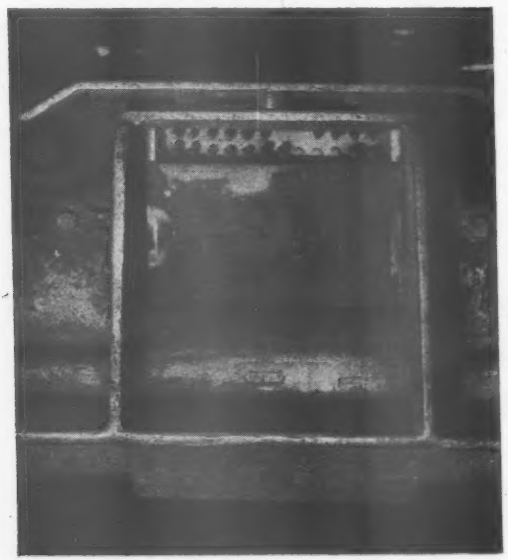

FIG. 3.—COOLING ARRANGEMENT, OUTER HEAD.

FIG. 4.—COOLING ARRANGEMENT, INNER HEAD.

FIG. 5.—CAM, ROLLER, AND SOOTER, IN OPERATION.

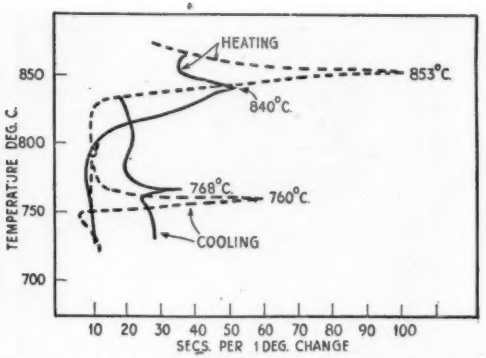

FIG. 7.—INVERSE RATE CURVES SHOWING TEMPERATURES OF PHASE CHANGE.

air, the resultant coating giving good thermal insulation, and assisting very materially the rapid removal of the solidified and cooling castings from the cavities.

The Casting Cycle

To appreciate the use of the various items set above, the following description of a typical cycle is given. Taking the point at which the dies are closed as the datum point, it is possible to give the settings of the various stations in terms of the number of dies beyond this. Pouring, which is done from a teapot ladle (suspended from a trolley on a short monorail in the roof) without stopping the machine, is one to two dies from closing. Opening occurs between the fourth or fifth die position, removal of the castings during the fifth or sixth to the seventh. The air cleaning is done at approximately the ninth die around from the closing point and the soot applied at the tenth. Any cores required are placed in position immediately following the sooting.

The metallurgical aspects of the casting cycle, as far as the process of solidification and cooling to the time of extraction are concerned, should be considered at this point. The metal temperature, at the pouring point, is between 1,260 and 1,320 deg. C, the surface temperature of the moulds being between 150 and 250 deg. C, both temperatures being governed by the metal section and weight of the castings poured. As the metal enters the mould, the thin layer of soot prevents instantaneous freezing, although the metal does solidify adjacent to the mould walls within a very short interval of time after its arrival at that position.

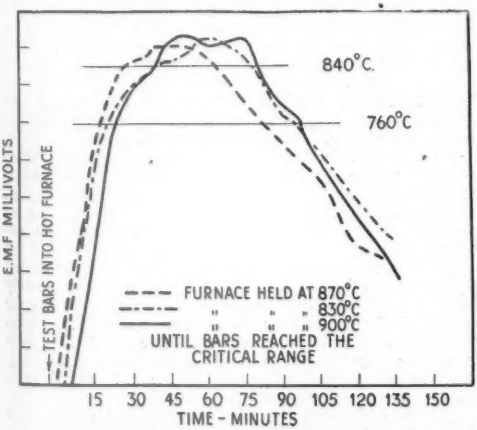
840°C.
760°C.
E.M.F. MILLIVOLTS
TEST BARS INTO HOT FURNACE
FURNACE HELD AT 870°C
" " " 830°C
" " " 900°C
UNTIL BARS REACHED THE CRITICAL RANGE
15 30 45 60 75 90 105 120 135 150
TIME - MINUTES

FIG. 6.—EXPERIMENTAL TIME-TEMPERATURE CURVES.

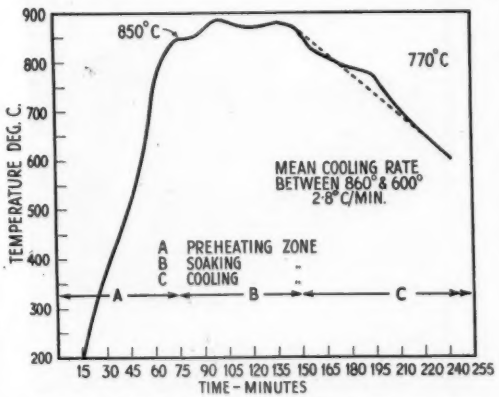

FIG. 8.—TYPICAL TIME-TEMPERATURE CURVE FROM PRODUCTION FURNACE.

D

FIGS. 9 AND 10.—LOADING AND UNLOADING ENDS OF HEAT-TREATMENT FURNACE.

FIG. 11.—FURNACE PYROMETER CONTROL PANEL.

At this point, the rate of sensible heat flow into the mould is not much greater than that of heat extraction through the mould walls, and the iron is cooled rapidly below its normal solidification temperature. The evolution of the latent heat upon actual solidification of the first layers is mainly dissipated through the mould walls. Thus, the temperature gradient between the mould walls and the outer layer of the solidifying casting is reduced and the further evolution of latent heat is partially lost through the walls and partially absorbed by the still liquid metal which, in heavy sections, may still be filling the cavity through the interior of the casting. Thus the undercooling is reduced from edge to centre of heavier sectioned castings, the precise degree of reduction in cooling rate depending almost solely on die and pouring temperatures. Even the heaviest sections, made by this process, exhibit marked signs of undercooling, as evidenced by a well defined primary dendrite pattern and the typical fine dispersion of graphite, variously known as eutectiform, delta-type, undercooled or supercooled.

With very thin castings, sharp-edged sections (particularly where the joint coincides with the sharp edge) or with cold dies, the undercooling may be sufficient to suppress the formation of graphite, giving rise to mottled or chilled zones. Due, however, to the extreme rapidity of solidification, the temperature at which it occurs and the number of centres from which crystallisation begins, the cementite is in an extremely fine state of division, and the surrounding austenite matrix—before breaking down to pearlite—is supersaturated with respect to carbon. The result of this is to reduce the soaking time in subsequent heat-treatment to effect re-solution of carbide and its ultimate breakdown to ferrite and graphite.

The time elapsing between pouring and removal of the castings from the die is governed by the cycle of the machine and the setting of the ejection point, both

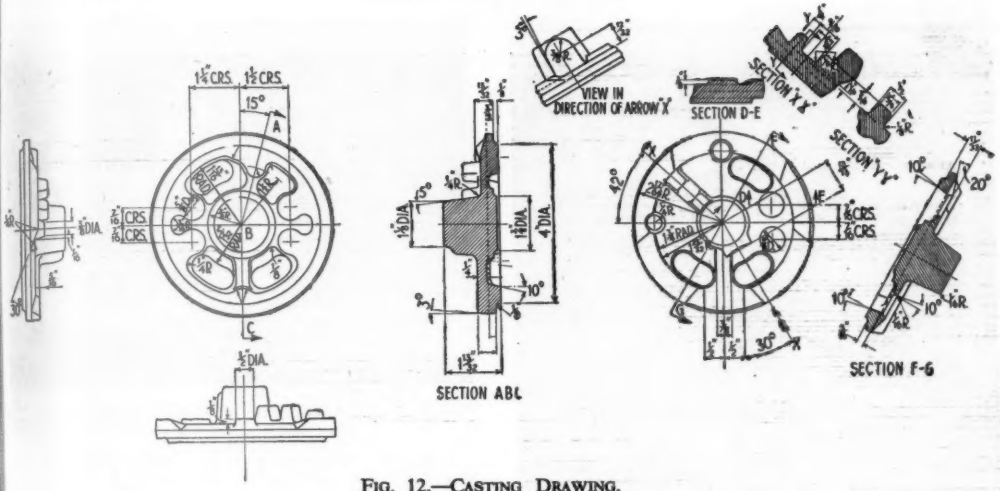

FIG. 12.—CASTING DRAWING.

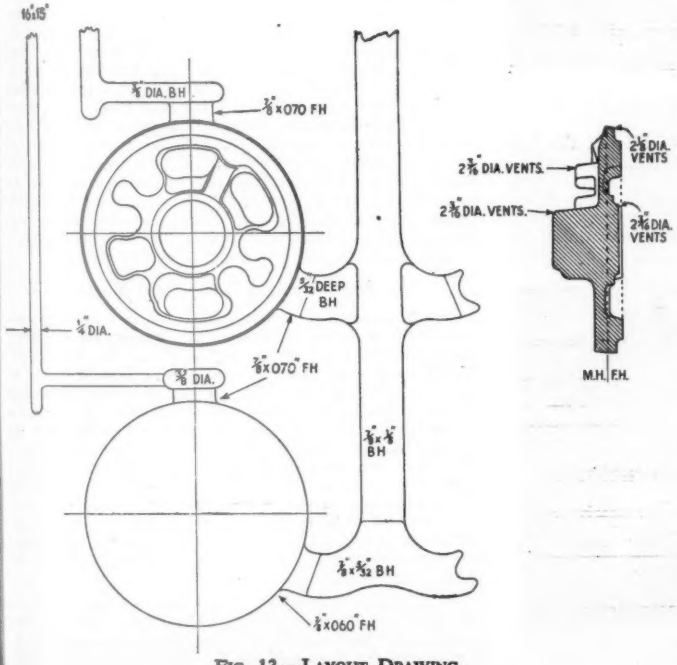

FIG. 13.—LAYOUT DRAWING.

being determined by the average mass and section of the castings made on the particular machine. With uniform sections, ejection is generally within a steady temperature range. With varying thickness, a balance has to be struck between the time required to ensure complete solidification of the heaviest sections and the time to minimise the cooling of the thinnest sections below a black heat. Generally speaking, the aim is to complete the removal of the casting, before the pearlite interval is passed.

Heat-treatment Process

To complete the metallurgical aspects of the production processes, it is proposed to deal with the heat-treatment of the castings. To eliminate the possibility of chilled areas, to render the matrix uniform (as ferrite) for maximum machineability, and to ensure that all castings will be as free as possible from internal stresses, a standard heat treatment is given. The castings are raised rapidly and evenly to a temperature within the pearlite interval, and held there for a sufficient time to secure equilibrium between austenite, cementite and graphite, followed by a sufficiently slow

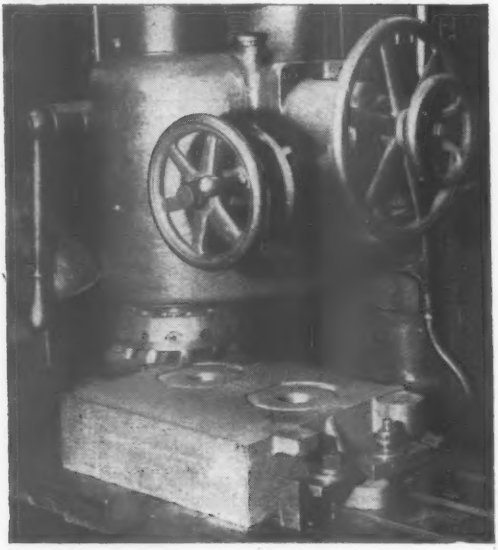

FIG. 14.—DIE-FACING OPERATION.

cooling, to ensure the breakdown of all but the last traces of iron carbide (that associated with the steadite) into ferrite and graphite.

Laboratory experiments, using small batches of standard test bars in a semi-muffle type gas fired furnace, have been carried out to check the optimum conditions. The temperatures were obtained by means

FIG. 15.—CONVENTIONAL MARKING-OUT PRACTICE.

FIG. 16.—MARKING-OUT, USING TEMPLATES.

of a thermocouple, inserted into the middle of the batch of bars, readings being taken with a potentiometer. Various heating and cooling rates were tried, the results of some of these experiments being shown in Fig. 6, in the form of normal time-temperature curves, and the regions around the change points as inverse-rate curves (Fig. 7). For comparison with these, a typical diagram, obtained from the production oven, is given in Fig. 8), the readings for the construction of which were taken with the aid of a 50 ft. long, rare-metal thermocouple. Time readings were taken for each 0.1 mV. change in e.m.f. using a potentiometer. No corrections have been made for the possible influence of the length of the couple in the oven and its temperature. To ensure fair measurement of the actual temperature of the castings, the tip of the couple was inserted in a small hole, drilled into the body of a casting placed on the top layer of the load.

The Continuous Heat-treatment Furnace

The furnace used is a gas-fired tunnel oven approximately 50 ft. long. Castings are loaded on to heat-resisting steel trays, 9 in. wide, 3 ft. 9 in. long, with the ends approximately 4½ in. high. The bottoms of these are corrugated, and form one continuous moving hearth in the oven. The trays are pushed through, by means of a 15 h.p. pusher, operated either by an automatic time switch, or by a push button control. The trays are supported on four round, heat-resisting steel bars along which they slide. As the trays reach the cooling end of the hearth, they are lifted by means of a pair of lazy tongs, suspended from a monorail, tilted and emptied into tubs, the tongs and empty trays being transferred by the monorail to the loading end (Figs. 9 and 10).

The furnace is fired by town gas and low pressure air admitted through burners along the sides of the first half of the oven. The products of combustion pass across the crown of the furnace, over the castings.

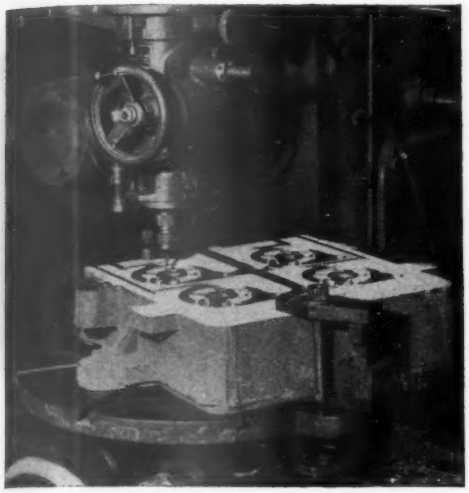

FIG. 17.—MILLING THE FLOW-OFF.

and out through flues located under the trays. The second half of the furnace is provided with a slotted roof and is designed to ensure steady cooling of the load. The time and temperature cycle is affected by the load going through, the frequency of pushing and the setting of the burners. With, as far as possible, a constant setting of the burners and pushing times, this cycle is controlled by the load primarily. Automatic compensation for slight variations is made by relays situated in the control panel (Fig. 11), the relays being operated by thermocouples situated in the heating and soaking zones. The relays operate a control valve on the main air/gas supply.

Die Making

Before considering the general layout and organisation of the plant, it is pertinent to discuss the manufacture and preparation of the dies themselves. These are iron castings made largely in a conventional manner, and all of them partially, or completely, machined on the face containing the casting cavities. Six standard die sizes are used, except for special castings requiring irregular joints or modified shapes. Skeleton patterns for each size are kept in stock, together with master patterns, or core boxes, for producing required mould forms or contours on the front and rear faces of the dies. In addition to such types, blank dies are also cast and kept in stock; these, of course, require complete machining of the mould cavities. In the case of the other class of dies, some may be cast-to-form, requiring only hand finishing and machining of runners and sprues, whilst others only roughly cast-to-form have machining allowances on the profile, and therefore require subsequent operations, and

FIG. 18.—HAND FINISHING WITH FLEX-GRINDER.

FIG. 19.—FLY-CUTTER OPERATION.

Ferrous Die Castings

intermediate between the true cast-to-form and the blank dies.

The precise details and method are decided upon when dealing with the initial enquiry from the customer. From the working drawing, a castings drawing is prepared, including any desired modifications to assist in manufacture and indicating all necessary drafts and taper (Fig. 12). A layout drawing (Fig. 13) giving dimensions of sprues, gates, flow-off, number and position of cavities in the mould, etc., is made at the same time, together with an indication of the method of die production. When the casting drawing is approved by the customer, the orders are passed through to the appropriate departments and the required dies are cast.

After facing back and front (Fig. 14) on a vertical milling machine, the dies are transferred to the marking-out section, where cavities are marked out (Fig. 15) and centre lines added, for the purpose of matching up the two halves. Where it is a case of production of running lines, master templates are used for both cavities and sprues (Fig. 16), but the provision of such templates for one or two dies off, is no saving of time or effort. Down-sprues and ingates are milled out with square-ended cutters, the flow-offs and warmers being machined with spherical-ended cutters (Fig. 17). Cast to form dies, at this stage, require only a final hand finishing operation, this being carried out with small flex-grinders (Fig. 18).

On other dies, the type of machining operation required, depends upon the particular contours of the mould cavity. For sections such as wheels, pulleys and similar, symmetrical circular solids, fly-cutters are used in a drill-press (Fig. 19). Other sections are milled on vertical or horizontal millers, using form tools or standard taper cutters, according to the finished shape. The final stages in the machining are the drilling of vent holes and fitting of slotted vent pegs in the locations where the expanding gases may be trapped by the filling of the die during the casting operation and the fitting of ¼ in. master dowels which after satisfactory matching has been proved, are replaced by ⅛ in. dia. pins and bushes in the lugs. This latter step is not

FIG. 21.—COREING-UP, SINGLE UNIT.

FIG. 20.—SPRAYING OF DIE-COAT.

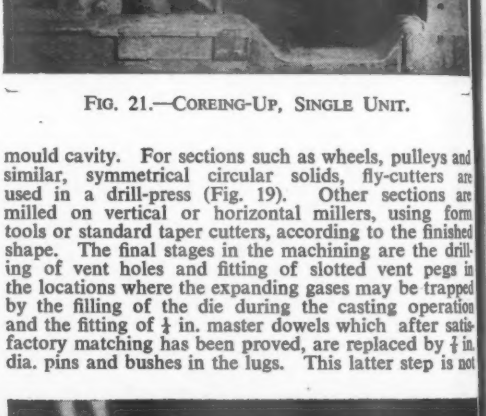

FIG. 22.—CASTINGS READY FOR REMOVAL, SINGLE UNIT.

taken, however, until lead samples have been cast, in the die-making department, to check the dimensional accuracy of the mould cavities.

The die is then passed to the foundry, where it is lightly shotblasted and then warmed, to receive a coating of refractory wash. This coating is sprayed and baked on, Fig. 20, and provides a protection against direct contact with molten iron. The die is then mounted on a single unit machine and samples are made for submitting to the customer for approval, before any production quantities whatsoever are made. Figs. 21 and 22 show the coreing up, and the castings before removal, during the making of samples on the single unit machine. This machine is virtually a one-twelfth segment of the production machine and Fig. 22 shows further details of the construction of the main unit.

(To be concluded.)

Institute Elects New Members

SECOND LIST. (*Continued from page* 204).

As Members

T. Bishop, B.Met., A.I.M., Metallurgical Editor, *Iron & Coal Trades Review*; V. G. Brant, foreman, Windsor Art Foundry, Slough; Mrs. R. Butter, owner, Drury Bros., bell founders, London; A. T. Davey, managing director, Manufacturing Services, Limited, Gloucester; V. V. Doodhar, B.Sc., manager, G. G. Dandekar Machine Works, Limited, Bhiwandi, India; E. H. Dudley, works manager, Dudley & Dowell, Limited, Halesowen; H. Forgham, foundry manager and director, Homa Foundry, Limited, Birmingham; J. E. Harrison, works manager, Pillatt & Company, Limited, Stapleford; O. Harsem, managing director, Kristiansands Jernstoperi, Norway; W. James, director, Monmer Foundry, Limited, Willenhall; H. Inayat, managing partner, C.P. Foundry Works, Itwara, Nagpur, C.P. India; D. Lewis, works engineer, Pillatt & Company, Limited, Stapleford; S. A. Nathani, director, Crescent Iron & Steel Corporation, Limited, Bombay; F. H. Neal, sales representative, Guest, Keen & Baldwins, Limited; James Paul, metallurgist, North British Steel Foundry, Limited, Bathgate; R. W. Ruddle, M.A., A.I.M., research metallurgist, B.N.F.M.R.A.; W. F. Tragarz, foundry supervisor, European Operations, International Harvester Company, Brussels; J. H. Ubbink, foundry manager, Doesburg, Holland; W. B. Wallis, president, Pittsburgh Lectromett Furnace Corporation, U.S.A.; A. H. Robinson, foundry manager, Dudley Foundry Company, Limited; D. A. Charles,* assistant manager, Harland & Wolff, Limited, Glasgow.

As Associate Members

W. A. Backhouse, patternmaker, Dartmouth Patternmaking Company, West Bromwich; R. K. Bhowmik, B.Sc., student, Winget, Limited, Rochester; A. D. R. B. Bradney, patternmaker, E. A. & H. Sandford, Limited, Gravesend; N. Croft, assistant foundry metallurgist, F. H. Lloyd & Company, Limited, Wednesbury; G. I. Duffin, assistant, standards department, Carntyne Steel Castings, Limited, Renfrew; S. K. Dutta, assistant works manager, S. K. Chakravarti, Limited, Calcutta; J. A. Gardiner, metallurgist, F. & M. Supplies, Limited, London; A. H. Jackson, moulder, Bristol Aeroplane Company; R. G. Gilmour, assistant metallurgist, Bristol Aeroplane Company; A. Goudie, technical development engineer, International Meehanite Metal Company, Limited, London; J. Henderson, foreman moulder, Henry Brown & Company, Larbert; F. J. Hook, foreman inspector, Bristol Aeroplane Company; H. London, metallurgist, H. Balfour & Company, Leven; F. J. Martin, patternmaker, R. Cort & Son, Limited, Reading; M. M. Misra, student, Enfield Foundry Company; W. J. Pound, chargehand patternmaker, W. & T. Avery, Limited, Birmingham; A. C. Robinson, foundry foreman, Baker Perkins, Limited, Peterborough; M. H. Shotton, assistant to works manager, Shotton Bros., Limited, Birmingham; J. R. Stirling, moulder, Bristol Aeroplane Company; F. Walton, chargehand patternmaker, Reyrolles, Limited, Newcastle; J. D. Doyle,† foundry manager, Commonwealth Aircraft Corp. Pty., Limited, Australia.

As Associates (over 21)

D. F. Bailey, patternmaker, Sterling Metals, Limited, Coventry; K. A. Cole, metallurgist, British Cast Iron Research Association; R. Godding, research assistant, British Cast Iron Research Association; H. R. Perkins, technical representative, Midland Motor Cylinder Company, Birmingham; W. G. Tonks, works trainee, W. & T. Avery, Limited, Birmingham.

As Associates (under 21)

M. S. Routley, foundry trainee, Ealing Park Foundry, London; R. A. Rush, moulder, Ransomes & Rapier, Limited, Ipswich.

THIRD LIST

As Subscribing Firm Members

H. Broadbent & Son, Park Street Foundry, Ashton-under-Lyne, ironfounders (representative, H. H. Broadbent). Jackson & Brother, Limited, Wharf Foundry, Bolton, ironfounders and engineers (representative, R. Hammond).

As Members

G. E. M. Barnes, fettling shop superintendent, Catton & Company, Leeds; A. Barrett, foundry manager, W. Slingsby & Company, Limited, Keighley; R. Bates, partner, Freeman & Bates, Manchester; A. M. I. El-Zayat, assistant foundry foreman, E.S. Railway, Cairo; A. H. Freeman, partner, Freeman & Bates, Manchester; L. Hearnshaw, foundry superintendent, Staveley Coal & Iron Company; T. Woods, M.B.E., works manager, West Yorkshire Foundries, Limited; J. E. Worthington, B.Sc., foundry technical officer, British Iron & Steel Research Association; H. H. Valberg,* assistant to managing director, Kresta Foundry & Engineering Company, Limited, Widnes.

As Associate Members

W. Downs, partner, H. Downs & Sons, Huddersfield; E. W. Kemp, foundry superintendent, West Yorkshire

(*Concluded on page* 248.)

*Transferred from Associate Member.

†Transferred from Associate.

Institute of Vitreous Enamellers'

Annual Banquet

The banquet in the Grosvenor Room of the Grand Hotel on November 7 was a very pleasant function. A large company, including many ladies, attended. Mr. R. J. Rogers (President) was in the chair and there were numerous guests, including some from overseas.

In proposing the toast "The City of Birmingham and its Industries," Mr. J. W. Gardom (Immediate Past President of the Institute . . .) referred to the Soho Foundry, where Matthew Boulton, the first modern capitalist and the first to apply modern production methods, laid the foundation stone of this industrial world.

Speaking of the future he pointed to the truth of the slogan "We Work or Want," which had always been realised by the industrialist, and it was upon him that the future depended. The industrialist had regained some of his lost prestige by producing brilliantly during the war. Nevertheless, it must be agreed that, on the factory production floor, we were very much behind other spheres of the world in our development. There was to-day the possibility of a completely automatic machine to produce everything, a machine that could work faster, better and continuously; a machine with eyes better than our eyes, that could calculate and record more accurately than brain or memory.

"Flat" Factories

Alderman A. S. Giles, O.B.E., M.C., J.P., responding, said Birmingham had grown up in a haphazard way, and slums had been created, and intermingled with those slums were small factories which were dependent on orders received from larger firms. The city authorities realised that, whenever they cleared large areas, they ran the serious risk of destroying all those small factories which were the very life-blood of their city and of their big works. Re-development plans had been made, and some industries were prepared to re-house their own members, while the Corporation was preparing to re-house others for them, in what had long been known in the United States as flat factories. That would enable the city to re-house a large number of their working people not too far away from the factories where they worked. It would be entirely wrong to do anything so drastic that the small firms would be adversely interfered with.

"History of Enamelling"

The toast of "The Institute of Vitreous Enamellers and the Vitreous Enamelling Industry" was submitted by Dr. Harold Hartley (President, Institution of Gas Engineers; and British Cast Iron Research Association). He said commercial enamelling, as we know it, really originated early in the 19 century in Bohemia. The purpose was the making of cooking utensils, and a cast iron base was used. The enamels, however, contained much arsenic and lead and were poisonous. But things were moving in England. In 1839 the firm of T. & C. Clark, of Wolverhampton, obtained a patent for the application of non-poisonous enamels to cast iron vessels. Others also undertook the manufacture of similar articles. Legal proceedings ensued. He was interested to find that, in the course of the hearing, it transpired that enamelled cooking vessels had been made and sold in Birmingham by the Eagle Foundry prior to the date of the Clark patent.

About the middle of the 19th century the making of enamelled cast iron baths was started in England; then Scottish foundries took up the process, and the manufacture had developed steadily ever since. It was remarkable that, in 1885, there were no cast iron baths made in the United States. Representatives of interested firms in that country then visited Scotland to get examples of the casting and to gain experience in the work.

A Secret Process

Like so many of the processes which grew up during the Industrial Revolution, the application of vitreous enamel to iron and steel for a long time remained an art which was developed on an empirical basis. Even some thirty odd years ago, when he had had first to concern himself with the process, there was little in the way of technical literature in this country to help a newcomer. The leading text books in English were such as Dr. Hodgson's translations of Grunwald's publications. The comparison between the method of treating the subject in the old books and in those published later indicated a profound change of outlook which had taken place in twenty years. In those earlier days the enamelling shops in this country were places in which there was operated a secret process, largely based on knowledge possessed by the man in charge, who, in his turn, had probably received recipes from his father who had preceded him. In some cases, even the raw materials used were unknown to the management of the business. Rapid development could not be expected under such conditions as, after all, no man however skilled in the art could of himself acquire much of the knowledge necessary to effect real improvement in such a complicated material as vitreous enamel. Nevertheless, through the years, a great deal of experience had been acquired, and methods had been evolved for overcoming some of the more common troubles. He well remembered, however, how he was assured, on taking over an enamelling department, that all the defects inspected were due to "bad iron." Thus they were in no degree the responsibility of the enameller. To-day, all men knew their troubles were due to bad enamel, whilst the maker of the enamel was equally sure that bad processing was responsible! Of course, if the troubles arose with cast iron enamelling, the two would combine like man and wife and go for the foundryman with tooth and claw!

The enamelling industry of this country owed much to the fact that our domestic appliance industries started to apply enamels to more of their products. To-day, probably at least 50 per cent. of the total yearly output of the enamelled goods made in this country was represented by the cookers provided for domestic use, even making allowance for the large output of

enamelled cast iron baths, and the products of the hollow-ware industry. The call by those industries for improved resistance to abrasion, to the action of dilute food acids and superlatively good finish had been responsible in no small measure for the stimulation of those concerned in the making of better enamels.

As a result of the developments effected for domestic apparatus, there was now a greater appreciation among the technical specialists themselves of the possibility of effecting a distinct improvement both in the enamels and in the method of processing. Enamels were more complex silicates than ordinary glass, but the industry could gain much by co-operation with glass technologists.

Progress was becoming so rapid that the empirical methods of yesterday could no longer keep them abreast of developments abroad. Yet if they would only see to it that competent young chemists, physicists and mineralogists were induced to work on their problems, they would keep in the forefront. There were being made in this country enamels which were at least as good as any produced elsewhere. In some respects, they were better, because the applications for which they were required called for the satisfaction of more stringent conditions than were demanded by the foreigner in the same field. The new titanium enamels, for example, had been developed largely as the result of work done in this country, and they offered very attractive possibilities for further development. It could be justly claimed that, in the leading organisations, progress was being effected on scientific lines.

Objects for Research

The scientific approach was essential, and research applied properly would yield a great reward. The possibilities of further development seemed boundless, but more fundamental knowledge was needed. They must get at the root of the problem, and endeavour to obtain an understanding of the ultimate atomic structure of enamels. Such knowledge would provide a surer foundation on which to base further advances. Results which now seemed incapable of explanation would be found then not to be anomalous but only part of an ordered scheme.

Every endeavour should be made to induce scientifically trained men to enter the industry, and, in order that their work might be used to the best advantage, more technical training should be provided for production personnel. To some extent, larger organisations did that work for themselves, but, if the industry as a whole was to benefit and keep moving ahead, co-operative action was needed. In that direction he suggested the Institute could do good work and there was, so far as he was aware, no other group so fitted to shoulder the task. The fact that the financial value of the output of the industry was probably less than £5,000,000 a year meant that they could not expect to acquire a large annual income from their member firms for research and development work, both of which were needed. Probably the support from industry might not be adequate to gain the support of the Directorate of Scientific and Industrial Research, which sponsored industrial research associations. It might also be that the industry was not yet ripe for the development of its own research association, although, ultimately, every endeavour should be made to attain that end. They might, however, be able to come to an understanding with some other body or organisation to co-operate in the development they desired.

Mr. R. J. Rogers assured Dr. Hartley that the Council of their Institute were fully alive to the importance of research. In their humble way, they had been for the past few years combining the operations of the members of their Institute on various committees and sub-committees on several research problems, and they had done their best to encourage young men to devote their attention to the problems which faced the enamelling industry. The Council were most desirous of encouraging young technicians in the industry to devote their time and attention to the subjects of research within their own trade and within their own undertakings, and he knew that he would not be asking in vain that employers and leaders in the industry should give those young men the utmost amount of encouragement and opportunity for them to carry out researches in their respective works.

Dr. Hartley had referred to the absence in earlier days of scientific knowledge and control in connection with that industry. It was not until 1934 that that Institute was formed in Birmingham where there was previously no opportunity for people engaged in that industry to get together and to combine their knowledge with a view to improving the technique of enamelling. When he told them that the membership in the first year was 126, while to-day it was 332, he thought everyone would agree that they were making satisfactory progress. Dr. Hartley had suggested ways which he hoped they might be able to use in view of the fact that research cost a lot of money. The Council, and members of the Institute generally, realised that they could not be expected to do any great amount of research work because of the lack of funds, but the Council had now decided to ask the British Refractory Association, of Stoke-on-Trent, to investigate a substitute for Mohrs scale. That was their first embarkation on a fundamental research work through that Association.

Raw Materials

During the past year, the Council had, from time to time, collaborated with various Government Departments to ensure that essential raw materials were made available to the vitreous enamelling industry, and he wished to pay a tribute to the great personal effort which was being made by the Hon. Secretary of the Institute, Mr. Thomas, on their behalf. It must be remembered that that industry provided appliances which were in daily need by the British public, and had also to provide a wide range of articles for export. In that connection, it was interesting to note a statement by Mr. Harold Wilson, the President of the Board of Trade, that firms producing indirectly for export and firms producing goods which saved imports would get equal priority with firms producing directly for export. Those engaged in industrial organisations realised how frequently they de-

Vitreous Enamellers

pended upon the smaller manufacturer for components to complete the assembly of their main product. They should, therefore, do all in their power to ensure that the activities of the smaller manufacturers were not unduly restricted by Government control.

Mr. H. H. Aston proposed the toast of "Our Guests," observing that the Council had always been very conscious of the great help which it had always had from its many friends, both inside and outside the industry, and that this Conference had not been an exception, for they had had a very big gathering of very distinguished friends. In extending special welcomes to the ladies and to guests whom he named, Mr. Aston said they were gratified to welcome prominent members of kindred associations, among whom was Sir Charles F. Goodeve. He did not think any of them would be in doubt that they derived great benefit from the work of the British Iron and Steel Research Association of which Sir Charles was Director of Research. The Institute had also benefited enormously from the co-operation of those two able bodies, the Institute of British Foundrymen and the British Cast Iron Research Association.

International Congress

Referring to the widespread interest in the industry which was being shown by other countries, particularly those to which Britons were now forced to export their products, Mr. Aston said he was privileged to make what he considered a really important announcement. The Council had decided to hold an international technical congress at Bournemouth at Whitsuntide, 1948. That would be the first organised in connection with the vitreous enamelling industry, and it was intended to invite people who could help the industry to come from all countries.

SIR CHARLES F. GOODEVE, D.Sc., F.R.S. (Director of Research, British Iron and Steel Association) responded. He thanked the Council for the way in which they had kept the flag of research flying during the past few years, and hoped they would keep it flying with ever greater vigour. That reflected very great credit on the Institute. He wished to make one qualification. There seemed to be an opinion that research could be done without any money or be dependent on other benevolent industries. That, of course, was not the case. If they had any doubts upon that point, he recommended that they should look at the analysis made by the Federation of British Industries on research in this country published about a week earlier. There they would see the total cost of research activity in pounds sterling divided into detailed industrial figures, and they would be able to make a percentage comparison with their own industry. He strongly recommended that, because he did not agree that theirs was a small industry.

WE THANK J. Collis & Sons, Limited, Regent Square, Gray's Inn Road, London, W.C.1, for sending us a blotting pad carrying an illustration of a roller conveyor and a calendar for November and December.

Institute Elects New Members

(*Concluded from page* 245.)

Foundries, Limited, Leeds; M. W. Laycock, works engineer, West Yorkshire Foundries, Limited, Leeds; J. W. McKenzie, planning controller, West Yorkshire Foundries, Limited, Leeds; T. H. Perrin, foundry draughtsman, Prince Smith & Stells, Limited, Keighley; J. Phillips, foundry supervisor, P. R. Jackson & Company, Salford; W. Rogers, assistant foundry foreman, Wm. Wadsworth & Sons, Limited, Bolton; H. Whiteman, ratefixer, Butterworth & Dickinson, Accrington; C. H. Wylde, foundry superintendent, West Yorkshire Foundries, Limited, Leeds.

As Associates (*over* 21)

A. Bendelow, moulder, Markham & Company, Limited, Chesterfield; N. Y. Newton, B.Sc.(Met.), foundry trainee, English Steel Corporation, Limited, Sheffield; R. Spencer, moulder, R.O.F., Patricroft; H. Stringer, moulder, Brightside Foundry & Engineering Company, Limited, Sheffield.

FOURTH LIST

As Subscribing Firm Member

Gimson & Company (Leicester), Limited, Vulcan Road, Leicester, ironfounders and engineers (representative, H. G. Wainwright).

As Members

D. C. Miller, works manager, Lion Foundry Company, Limited; C. Vaughan, general manager steel foundry, Qualcast, Limited, Derby.

As Associate Members

R. Dolby, metallurgical chemist, Harrison & Company, Lincoln; R. F. Kerry, floor moulder, Beeston Boiler Company, Notts; C. W. Lockhart, foundry superintendent, Qualcast, Limited, Derby; G. C. A. Morgan, production engineer, Richards (Leicester) Limited; D. Newstead, laboratory assistant, Stanton Ironworks Company, Limited, Notts; C. H. Norris, laboratory assistant, Harrison & Company, Lincoln; K. S. Scott, patternmaker, Beeston Boiler Company, Notts; L. J. W. Underwood, service engineer, British Moulding Machine Company, Faversham.

As Associate (*over* 21)

P. M. F. Ramage, foundry foreman, Qualcast, Limited, Derby.

FIFTH LIST

As Members

O. Shafik, engineer, Egyptian State Railways; E. Walker, foundry manager, Butterley Company, Limited, Ripley.

As Associate Members

A. F. Waters, coremaker, Ley's Malleable Castings, Limited, Derby; T. R. Eastwood, foundry foreman, Rolls Royce, Limited, Derby; F. Holdsworth, assistant metallurgist, West Yorkshire Foundries, Limited, Leeds; P. Wood, assistant metallurgist, West Yorkshire Foundries, Limited, Leeds; J. Aston,† assistant metallurgist, West Yorkshire Foundries, Limited, Leeds.

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†Transferred from Associate.

October Iron and Steel Output

Steel Production Attains Record Rate

Steel production in October reached a new high record rate, exceeding the production of any previous monthly period. This new record production was at an annual rate of 14,316,000 tons, compared with 13,841,000 tons a year in September and 13,226,000 tons in October, 1946.

Pig-iron production also showed an increase to an annual rate of 8,352,000 tons, compared with 7,805,000 tons in September and 8,102,000 tons a year ago. Pig-iron is still below current requirements, as coke supplies continue to be substantially below the allocation figure. The present low stocks of pig-iron and other raw materials cause particular anxiety, as the limitations on transport mean that any interruption results in a quick check to output.

Latest output figures compare as follow with earlier returns:—

	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
	Tons.	Tons.	Tons.	Tons.
1947—1st quarter ..	134,400	6,989,000	216,000	11,231,000
2nd quarter ..	141,600	7,363,000	244,100	12,694,000
3rd quarter ..	146,700	7,628,000	235,400	12,241,000
September ..	150,100	7,805,000	266,200	13,841,000
October ..	160,600	8,352,000	275,300	14,316,000
1946—1st quarter ..	145,000	7,566,000	242,600	12,617,000
2nd quarter ..	150,500	7,827,000	252,100	13,111,000
3rd quarter ..	146,600	7,622,000	230,000	11,953,000
September ..	147,300	7,660,000	238,500	12,402,000
October ..	155,800	8,102,000	254,300	13,226,000

Iron and Steel Institute

Sir A. McCance to be New President

Sir Andrew McCance, F.R.S., has been elected to succeed Dr. C. H. Desch as president of the Iron and Steel Institute. Sir Andrew, one of the foremost metallurgists in the country, has enjoyed an international reputation for many years. He became a director of David Colville & Sons, Limited, in 1930, and was appointed deputy chairman and joint managing director of Colvilles, Limited, in May, 1944. In 1940, he was awarded the Bessemer gold medal, the highest honour of the Iron and Steel Institute. Three years later Sir Andrew was elected a Fellow of the Royal Society. He was the first chairman of the Council of the British Iron and Steel Research Association, a position which he still holds.

The new president will be installed in office at the annual general meeting of the Institute to be held on May 5 and 6, 1948.

WILLIAM DENNY & BROS., LIMITED, Dumbarton, have received an order from the Indian General Navigation & Railway Company, Calcutta, for two paddle steamers for river service.

New Furnaces for Dorman, Long & Company

Stee Board Decision Awaited .

Important plans for the construction of new blast furnaces at the Cleveland Works of Dorman, Long & Company, Limited, have been revealed in a statement made by Mr. Ellis Hunter, vice-chairman of the company. The estimated cost of the project is £4,640,782. Full details have been given to the Steel Board and members of the Board have visited the site. An early decision is expected.

The primary intention is to build two blast furnaces for feeding molten iron to the new steel plant now in course of construction at Lackenby, but there will be room on the 48-acre site for five or six blast furnaces which may be required if the Lackenby site is developed to its maximum steelmaking and rolling capacity. With a hearth diameter of 27 ft. the two new blast furnaces will be the biggest in Britain and among the seven largest in the world. Raw materials will be delivered to the furnaces by belt conveyor and hot-metal ladles of 75-ton capacity. Consequently, new and more powerful locomotives will be required. Rolling stock will be used to transport the molten iron to Redcar and Lackenby.

Alluding to the B.I.S.F. seven-year development plan, now estimated to cost £200,000,000, Mr. Hunter said: "There is a disposition in some quarters to suggest that when these plans are carried through everything in the garden will be lovely. Actually I think the industry will have to think of another five-year plan quite soon—perhaps before a year is out."

Stocks and Sales of Non-ferrous Scrap

The Ministry of Supply announces that the stock of non-ferrous scrap on charge on September 30 was 48,823 tons, made up as follows:—S.A.A. cases, 5,010 tons; copper and copper alloy, 16,562; zinc and zinc alloy, 7,117; lead and lead alloy, 1,156; other grades, 18,978 tons.

Sales for the two months' period August to September amounted to 1,841 tons (approximate value £130,000). The analysis was as follows:—S.A.A. cases, 370 tons, copper and copper alloy, 472; zinc and zinc alloy, 10; lead and lead alloy, 739; other grades, 250 tons.

Material put out to tender during the period amounted to 600 tons, of which 561 tons were lead. During the August-September period, 10,268 tons were invoiced, the value being £786,885.

FIVE MEN AND A YOUTH were badly burned when half a ton of molten iron, which had been poured from a smelting furnace, exploded in a vat at the Firhill Works of Shaw & M'Innes, Limited, Glasgow, recently. Moisture in the vat is believed to have caused the explosion.

News in Brief

IT WAS REVEALED last week that the membership of the Iron and Steel Institute now totals 4,521.

STEELWORKERS at Darlington & Simpson Rolling Mills, Limited, have increased the output by over 10 per cent. in the last six months.

THE CUTLERS' COMPANY, of Sheffield, are presenting Princess Elizabeth with two pairs of old Sheffield plate candelabra as a wedding gift.

CONTRACTS FOR TWO twin-screw steam tugs have been placed with Ferguson Bros. (Port Glasgow), Limited, by the Crown Agents for the Colonies.

THE ADDRESS OF the British Rubber Development Board is now Market Buildings, Mark Lane, London, E.C.3 (telephone: Mansion House 9383).

THE PATTERNSHOP of Kerr & Company (Maryhill), Limited, ironfounders, etc., of Glasgow, was destroyed by fire recently. The foundry machine shop was damaged by water.

RECONVERSION OF THE 22,281-ton liner Strathaird, by Vickers-Armstrongs, Limited, Walker-on-Tyne, will be completed next month. The vessel has been in the Tyne about 14 months.

NORMAL WORKING has been resumed in the special castings foundry of the Staveley Coal & Iron Company, Limited, Chesterfield, following a strike stated to be due to difficulties which had arisen in the interpretation of certain national agreements.

AN ALL-TIME RECORD, exceeding the previous best figures for overseas shipments by nearly a thousand vehicles, was set up by the Ford Motor Company, Limited, Dagenham, in October, when almost 6,000 vehicles, valued at about £1,500,000, were exported.

TWO HUNDRED AND NINETY-THREE EMPLOYEES of the John Thompson Engineering Company, Limited, Wolverhampton, with an aggregate service of 5,500 years, recently received awards from Mr. W. J. Thompson, managing director, at the company's Dudley Works.

TO MEET THE country's need for greater and more economical production, the Turkish Government is to enlarge the Karabuk iron and steel works in Central Anatolia. New equipment will cost about £9,000,000, of which £5,000,000 worth will be purchased abroad.

SUBJECT TO APPROVAL at an extra-ordinary meeting on December 2, Barton & Sons, Limited, tubing and conduit manufacturers, of Dudley, Worcs, propose to offer 216,223 preference shares at 25s. per share to preference and ordinary stock holders registered on November 28.

REDLER EQUIPMENT, LIMITED, manufacturers of conveyors, elevators, etc., of Stroud, Glos, propose to increase their capital to £220,000 by the creation of an additional 55,000 5½ per cent. cumulative redeemable preference shares of £1 each and an additional 275,000 ordinary shares of 4s. each.

THE INTERIM STATEMENT for the nine months ending September 30, issued by the International Nickel Company of Canada, Limited, shows a net profit in terms of U.S. currency of $23,522,911 (against $19,556,009 in the corresponding period of last year). Net sales amounted to $120,521,241 ($92,652,938).

DORMAN, LONG & COMPANY, LIMITED, have secured an export order for oil equipment to the value of £198,568 for the Shell Petroleum Company. Head, Wrightson & Company, Limited, iron and steel founders, etc., of Thornaby-on-Tees, have obtained a £74,746 contract from the same company.

AT THE RECENT annual meeting of the British Valve Manufacturers' Association, Mr. J. M. Storey (Dewrance & Company, Limited) was re-elected president. Lt.-Col. J. McEwan Martin, of the Ministry of Supply, told the meeting that the valve industry was expected to provide £325,000 per month in exports by mid-1948.

TENDERS ARE INVITED by the Board of Trade for the purchase, subject to special conditions of sale, of 1,425 ordinary shares £1 each, fully paid, in Pyroheat, Limited, heat-treatment specialists, etc., of Birmingham. Details may be obtained from the Trading with the Enemy Department (Treasury and Board of Trade) T.E.4(A), 7, Crosby Square, London, E.C.3.

THE FOLLOWING NEW TITLES have been announced in respect of the directorate of the British Coal Utilisation Research Association:—Director-General, Dr. D. T. A. Townend; director of research laboratories, Dr. D. H. Bangham; director of engineering laboratories, Dr. E. G. Ritchie; director of domestic appliance laboratories, Mr. J. S. Hales; secretary and finance officer, Mr. H. T. Hathaway.

AN ISSUE OF 1,000,000 ordinary shares of 2s. at 2s. 6d. per share is to be made by Coley Metals, Limited, Hounslow, Middx, for the purpose of repaying the operating company's bank overdraft and enabling it to finance current purchases of scrap metals and extend its activities in other directions. The issue is to be made to shareholders registered on November 7 in the proportion of one new for each existing share held.

AT THE MINISTRY OF SUPPLY auction sale to be held at Depot No. 93, P.O.L. Site, Eardisley, Herefordshire, on December 4 and 5, a variety of plant and equipment will be on offer, including an overhead 2-ton electric travelling crane and gantry, gas and electric furnaces and heating ovens, sheet-oiling machines, etc. Catalogues, price 6d., may be obtained from the auctioneers, Russell, Baldwin & Bright, Limited, 20, King Street, Hereford.

SIX HUNDRED shipyard riveters, thrown idle some months ago through a strike of rivet heaters at Sunderland shipyards, are to be paid unemployment benefit for the time lost. This decision, made by the Ministry of Labour umpire, reverses that of the local Court of Referees, who decided that the riveters had a financial interest in the stoppage and therefore could not claim the benefit. Steps are being taken by the men to abolish the system whereby riveters pay part of the heaters' wages.

Parliamentary

Subsidy on Iron-ore Imports

MR. F. ANDERSON, who asked the Minister of Supply the total amount of subsidy paid upon imported iron ore from hard-currency countries and soft-currency countries, respectively, during the two years ended September 30, 1947, was told by MR. G. R. STRAUSS that the subsidy was related to abnormal ore freight charges and not to the cost of the ore itself. For the period from April 1, 1946 (when the present arrangements began) until September 30, 1947, the figures were approximately as follow:—Hard-currency areas: Newfoundland, 1,175,000 tons, subsidy £1,700,000, average per ton 29s.; Sweden, 3,000,000 tons, £2,500,000, 17s. Soft-currency areas: 5,750,000 tons, £5,500,000, 19s. Mr. Strauss added that Newfoundland freight rates had been reduced during recent months and the current subsidy now averaged 24s. a ton, making the average current rate of subsidy over all imports 19s. a ton. It should be noted that 80 per cent. of the Newfoundland ore and 20 per cent. of the Swedish ore were carried in British ships with freights payable in sterling.

Scientific Man-power Inquiries

MR. JANNER, who asked the Minister of Labour what progress was being made by the Committee which was inquiring into the probable requirements of scientific man-power in this country during the next few years with special regard to the requirements of each particular branch of science and technology; and whether, with a view to ensuring that the capacity of the universities was employed to the best advantage, the conclusion of this inquiry could be expedited, was told by MR. ISAACS that these inquiries, which were being conducted by the Technical Personnel Committee, of which Lord Hankey was chairman, were proceeding as quickly as possible. Those concerning chemical engineering, micro-biology, entomology, architecture and surveying, had been completed, and others regarding the demands for physicists, geologists and engineers were still in progress. A further inquiry into the demand for chemists and metallurgists would be commenced in the near future.

German Scrap Iron Supplies

MR. AUSTIN asked the Minister of Supply whether, in regard to the supply of scrap iron from Germany, he was satisfied that the needs of the iron and steel industry could be adequately met; and if he would make a statement.

In reply, MR. G. R. STRAUSS said he would prefer to postpone any statement pending the outcome of negotiations which were proceeding in Germany for the purchase of further quantities of scrap.

MR. G. R. STRAUSS, Minister of Supply, told Mr. Sparks that the approved programme of coal-to-oil conversion in the steel industry was about half completed. It was estimated that approximately 400,000 tons of coal had so far been saved.

Obituary

MR. JOHN STEPHEN ROBERTS, formerly with the Roath Engineering Company, Limited, Cardiff, died recently.

MR. JAMES ARCHIBALD BARR, a director of the Rotary Engineering Company, Limited, died suddenly on November 3.

MR. WILLIAM M'CONNACHIE, formerly analytical chemist with the Coltness Iron Company, Limited, Glasgow, died recently.

MR. GORDON VEARS, works manager and engineer of Lambert Bros. (Walsall), Limited, ironfounders, etc., has died at the age of 54.

MR. JOHN ARTHUR RELF, of Dudley, principal superintendent of Lloyds' Proving Houses, and well known in the Midlands chain industry, has died at the age of 51.

MR. ALEX. C. FRANK, who died on November 8, was until recently managing director of the Pattern Makers (Engineering) Company, Limited, Shrewsbury Road, Willesden, London, N.W.10, with which company he was associated for over 30 years. He was 80 years of age.

Institute of Welding

B.O.C. Prize Offer Accepted

The Council of the Institute of Welding have accepted the offer of the British Oxygen Company, Limited, to provide a prize of £100 a year for three years, to be known as the B.O.C. Welding Prize and to be awarded for a Paper submitted by a member of the Institute on some aspect of gas welding. The terms of the competition are being drawn up by the Institute and will be announced shortly.

The Sir William J. Larke medal and a prize of £50 have been awarded by the Council to Mr. J. Corston MacKain, of Edinburgh, for a Paper on the evolution of welded components in house construction and welded bunkers for power houses. The Papers submitted by Mr. J. R. Ferguson and Dr. H. Gottfeldt were highly commended.

Bairds & Dalmellington's Capital

The Court of Session has now confirmed the reduction of the capital of Bairds & Dalmellington, Limited, by 15s. per £1 unit, which was authorised by special resolution at an extra ordinary general meeting on June 19. The board has resolved that repayment to the extent of 15s. per £1 unit of ordinary stock held should be made on December 15, 1947, to those members on the register on November 13. Discharges in the form provided by the company and supported by stock and/or share certificates must be lodged by December 6.

Personal

MR. A. F. GADSBY has been elected to the board of Guest, Keen & Nettlefolds, Limited.

MR. PHILIP NORMAN WRIGHT has been appointed a director of the Butterley Company, Limited.

MR. RONALD STEEL has been appointed a director of Pickford, Holland & Company, Limited, manufacturers of refractories, etc., of Sheffield.

MR. F. D. GREEN has resigned from the board of Senior Economisers, Limited, manufacturers of fuel economisers, of Southampton Row, London, W.C.2.

MR. G. C. JONES, a director of Bourne & Jones, Limited, metal-casement manufacturers, of West Bromwich, is to be the next mayor of West Bromwich.

MR. D. C. HAGEN has been appointed chief draughtsman to G. & J. Weir, Limited, engineers and founders, of Glasgow. He has been with the company for 36 years.

MR. STEPHEN N. FURNESS, chairman of the Furness Shipbuilding Company, Limited, Haverton Hill-on-Tees, has been elected a member of the Tees Conservancy Commission.

MR. JOHN E. RENNEY, who was in charge of the tinsmiths' shop of the Staveley Coal & Iron Company, Limited, Chesterfield, retired recently. He had been with the company since 1890.

MR. MALCOLM BROWN, a past-president of the Sheffield branch of the Institute of British Foundrymen, has resigned from the boards of Andrews Toledo, Limited, Darwins, Limited, and their associated companies.

MR. J. R. C. HELMORE, second secretary (overseas), Board of Trade, will succeed Mr. H. J. Hutchinson as second secretary of the Board of Trade following the latter's appointment as secretary of the National Coal Board.

MR. GEORGE THACKER, now 72 years of age, is retiring after 23 years' service with Hunt Bros. (Oldbury), Limited, ironfounders and engineers. During the whole of this period he has never been late and only recently has he taken two days off for sickness.

MR. THOMAS CROSBY has resigned from the board of the Llanelly Steel Company (1907), Limited, after an association with the company extending over 50 years. The secretary, MR. H. W. PYLE, has been appointed a director of the company in his place.

MR. HENRY ROBB, who founded the firm of Henry Robb, Limited, Edinburgh, has been presented with a portrait of himself in oils by his fellow directors in order to mark his services to the shipbuilding industry, and also to celebrate the approaching 30th anniversary of the company.

MR. D. K. COUTTS has been appointed chief foundry metallurgist of the Indian Iron & Steel Company, Limited, at their Kulti Works, Bengal. He was previously in the service of the Government of India as metallurgist under the Inspectorate of Metal and Steel, Ishapore, Bengal.

MR. THOMAS STUBBS, iron and non-ferrous founder, of Water Street, Bollington, near Macclesfield, has retired. The business has been acquired by the Andrews Engineering Company, Limited, Waterloo Road, Stockport, who will carry it on as T. Stubbs, Limited. Mr. Stubbs was apprenticed to Martin H. Watts, engineers, ironfounders, etc., of Catherine Street, Macclesfield, and rose to be foreman there before opening his own business at Bollington, which he has carried on for the past 30 years.

DR. W. J. KEARTON, senior lecturer in mechanical engineering, has been appointed to the Harrison Chair of Mechanical Engineering at Liverpool University. Dr. Kearton joined the teaching staff of the mechanical engineering department of the university in 1919, after working at Vickers, Limited, on steam-driven submarines and steam turbines from 1915. He was awarded the T. Bernard Hall prize in 1924 and the Thomas Lowe Gray prize in 1947 for Papers read before the Institution of Mechanical Engineers, and the Derby medal in 1946 for a Paper read before the Liverpool Engineering Society. Dr. Kearton also served on the Heat Engines Trials Committee of the Institution of Civil Engineers and assisted in the preparation of the new code issued in 1927. He is 54 years of age.

Wills

ROSS, JOHN, metal merchant, of Aberdeen £6,993

JOHN, WILLIAM, of Stourbridge, Worcs, steelworker ... £4,664

MCCULLOCH, DUNCAN, of Romford, Essex, retired marine engineer £3,844

ARCHER, ANDREW, of Uddingston, retired engineer-surveyor to the British Engine Boiler & Electrical Insurance Company, Limited £1,243

BARRELL, R. C., a director of Norton-Griffiths (Plant), Limited, and the Tractor Equipment Company, Limited, of Hellidon, near Daventry £30,377

GIBB, MAJOR-GENERAL SIR E., associated with Sir Alexander Gibb & Partners, consulting civil engineers, of Westminster, London, S.W.1 ... £11,347

HALL, T. B., late chairman and managing director of Qualter, Hall & Company, Limited, colliery and coke-oven engineers, ironfounders, etc., of Barnsley £23,089

BLACKLOCK, C. T., managing director of the Clayton Dewandre Company, Limited, motor and general engineers, etc., of Lincoln, and chairman of Gyral Gears, Limited, Wandsworth, London, S.W.18 ... ... £36,431

Consumption of Non-ferrous Metals

Detailed figures of the consumption of non-ferrous metals in the United Kingdom during the third quarter of 1947 have been issued by the Directorate of Non-ferrous Metals. Consumption of virgin metal for the first, second and third quarters of 1947 was as follows:

	First quarter, 1947.	Second quarter, 1947.	Third quarter, 1947.
	Tons.	Tons.	Tons.
Zinc	48,701	57,946	54,545
Lead	42,535	40,237	44,650
Tin	6,663	6,857	6,346
Cadmium	122	130	129
Antimony	1,160	1,317	1,545

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Company News

(Figures for previous year in brackets.)

R. & J. Dick—Dividend of 25% (20%).

Minimax—Interim dividend of 8% (same).

Alfred Herbert—Interim dividend of 10%, tax free.

Johnson & Phillips—Interim dividend of 7½% (same).

Sun Electrical Company—Dividend of 7½% (4½%).

Glenfield & Kennedy—Interim dividend of 5% (same).

Guest, Keen & Nettlefolds—Interim dividend of 4% (same).

Burntisland Shipbuilding Company—Interim dividend of 5% (same).

Whitehead Iron & Steel Company—Interim dividend of 12½% (same).

George Kent—Final dividend of 7% (same), making 10% (same and bonus of 2½%).

Dowty Equipment—Final dividend of 7%, tax free, making 13%, tax free (20%, less tax).

Atlas Steel Foundry & Engineering Company—Final dividend of 27½%, making 42½% (same).

Neepsend Steel & Tool Corporation—Final dividend of 15% and bonus of 20%, making 50% (same).

John I. Thornycroft & Company—Final dividend of 10%, making 15% (same) and bonus of 7½% (5%).

Blakey's Boot Protectors—Final dividend of 10% (same) and bonus of 2½% (nil), making 22½% (20%).

Hallamshire Steel & File Company—Interim dividend of 25%, less tax, on larger capital (7½%, tax free).

Redler Equipment—Interim dividend of 17½% (same). No further dividend will be recommended in respect of this financial year.

Fleming & Ferguson—Final dividend of 10%, making 15% (same) and further distribution of 3%, tax free (nil), from realised appreciation of investments.

Willowbrook—Profit to July 31, £19,700 (£16,424); to taxation provision, £8,500 (same); general reserve, nil (£1,824); dividend of 10% (6% and bonus of 2½%); forward, £9,571 (£5,818).

Warne, Wright & Rowland—Interim dividend of 15% (7½%). The directors state that the increased dividend should not be taken as an indication of any increase in the total distribution for the year.

Oliver Pell Control—Net loss to March 31, £729 (net profit, £5,273); preference dividend for the 1½ years to December 31, 1945; forward, £7,635 (£9,590, plus £1,250, being option money on the shares of subsidiary).

Wolverhampton Die-Casting Company—Trading profit for the year ended June 30, after charging E.P.T., £53,340 (£30,487); to income tax, £19,974 (£10,049); net profit, £19,443 (£14,135); final dividend of 10%, making 15% (12½%); forward £46,510 (£32,962).

Yarrow & Company—Revenue for the year ended June 30, £116,903 (£113,433); to directors' fees, £1,600 (same); depreciation of buildings, £6,433 (£2,900); depreciation of plant, etc., £7,908 (£17,364); taxation, £47,500 (£35,000); to general reserve, owing to the uncertainty of the future, £100,000 (nil); dividend of 10% (same) and bonus of 5% (same), tax free; forward, £36,153 (£105,191).

Burco—Trading profit to September 30, £115,852 (£85,295); interest on investments, £2,610 (£1,703); to directors' fees, £375 (£400); depreciation, £5,639 (£3,234); taxation, £62,019 (£41,843); general reserve, £28,500 (£10,000); income-tax reserve, nil (£9,300); special depreciation of plant, nil (£2,500); dividend equalisation reserve, £2,000 (nil); dividend of 35% (20% and bonus of 15%); forward, £20,224 (£20,507).

R. & W. Hawthorn, Leslie & Company—Profit for the year ended June 30, including investment income and after depreciation, taxation and contingencies, £211,487 (£193,298); net profit, after directors' fees, £209,487 (£191,298); final dividend of 5% and bonus of 10%, making 20% (18%); further bonus of 1%, tax free, from interest on tax reserve certificates (same); to general reserve, £75,000 (same); forward, £98,549 (£71,544).

Electric Furnace Company—Dividend from subsidiary for the year ended March 31, £3,000 (£4,000); estimated E.P.T. recoverable, less provision for income tax, £35,000 (£54,000); reserves no longer required, £13,158 (nil); compensation for cancellation of agreement, £2,946 (nil); loss for year to date, £15,279 (£31,195); to general reserve, £10,000 (same); second interim dividend of 4½% (same), making 8% (same); forward, subject to directors' remuneration, £21,882 (£10,467).

Thompson Bros. (Bilston)—Trading profit to July 31, £75,964 (£73,396); other income, £1,574 (£1,033); to directors' fees, £150 (same); depreciation, £14,342 (£8,196); contingencies, £3,500 (nil); black-out removal, nil (£1,615); tax provision to April 5, 1949, £25,500 (April 5, 1947, £19,007); net profit, £34,041 (£45,458); to tax provision to April 5, 1948, £24,703; investment reserve, £1,208 (£1,150); general reserve, £10,000 (nil); employees' fund, £1,000 (nil); final dividend of 7½%, making 15% (same) and bonus of 10% (same); forward, £23,693 (£43,614).

Arthur Lee & Sons—Trading profit for the year ended July 31, £394,366 (£262,702); interest and dividends, £8,101 (£5,894); to directors' fees, £811 (£700); E.P.T., £47,000 (£43,704); profits tax, £19,000 (nil); income tax, £158,309 (£98,647); net profit, £177,347 (£125,545); taxation overprovided, £33,265 (£12,947); interest reserve, nil (£9,452); to superannuation, etc., £5,922 (£8,158); general reserve, £125,000 (£60,000); dividends on the "A" and "B" preference and ordinary shares, £70,966 (£70,040); forward, £67,298 (£58,574); final dividend on the ordinary shares of 9d. per 2s. 6d. unit, making 1s. 1½d.; special bonus, nil (£6,250).